

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

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Claim 1 (Currently amended): An information input processing computer system for mapping gestures to keys of a virtual keyboard, the system comprising one or several cameras, one or more memories with CPU connected to the cameras, and processes running in the CPU that associates gesture movements with typing and produce gesture associated textual output, wherein said processes capture gesture images, classify groups of gestures into each gesture image into one of a plurality of classes depending on the movement of the gesture, and associate each of the classes with one of the keys of the virtual keyboard.

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Claim 2 (Original): The gesture-key mapping system as in claim 1, where a feedback is provided to the user on what kind of keys are associated with the user's gestures.

Claim 3 (Original): The gesture-key mapping system as in claim 2, where the feedback is provided using one or more of the following: displaying keys on a display, playing sounds labels for keys, displaying image indicators on a display, playing special sound indicators, projecting the keyboard to any surface, and displaying picture of the keyboard with user's hands.

Claim 4 (Currently Amended): ~~The system as in claim 1,~~ An information input processing, gesture-key mapping computer system, the system comprising one or several cameras, one or more memories with CPU connected to the cameras, and processes running in the CPU that associates gesture movements with typing and produce gesture associated textual output, where the gesture-key processing is provided using the following modules:

- a) a gesture capturing module that captures gestures through camera sensors;
- b) a gesture classifier module that classifies gestures into classes of gesture movements;
- c) an associator module for associating gesture classes or sequence of gesture classes with one or several most probable keys; and

d) an integrator module that integrate sequence of candidate of most probable keys into unique output key sequence.

Claim 5 (Original): The system as in claim 4, where the integrator module includes one or more of the following:

a) language module component that estimate probabilities of word strings corresponding to key candidate sequences;

b) character frequency module that estimate probabilities of character strings corresponding key candidate sequences;

c) confusable matrix that estimate how often correct gesture classes are confusable with another gesture classes;

d) gesture classes probability model that estimate probability of observing a string of gesture classes given a sequence of gesture frames;

e) computation of a probability of production a sequence of keys given a string of gesture frames;

f) generation of a lattice of sequences of keys given sequence of gesture frames;

g) finding the most probable sequence of keys from the lattice of key candidate strings.

Claim 6 (Original): A system according to Claim 5, wherein each sequence of keys receives a probability score, and the sequences of keys that receive low scores are removed and are not continuing when new candidates for keys arrive.

Claim 7 (Original): A system according to Claim 1, further comprising a gesture correlator module to allow to adjust automatically an invisible keyboard to hand positions.

Claim 8 (Currently Amendment): The method for producing a textual output in which a user makes typing like gestures without the presence of a keyboard and the gestures are associated with the most probable keys that would be typed if a keyboard were presented, said method including the steps of using a computer system to map gestures to keys of a virtual keyboard, including the steps of running processes on the computer to capture gesture images, classifying groups of gestures into to classify each gesture image into one of a plurality of classes depending on the movement of the gesture, and to associate each of the classes with one of the keys of the virtual keyboard.

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Claim 9 (Currently Amended): ~~A method according to Claim 8,~~ The method for producing a textual output in which a user makes typing like gestures without the presence of a keyboard and the gestures are associated with the most probable keys that would be typed if a keyboard were presented, wherein the ~~probability~~ probability is computed using HMM.

Claim 10 (Currently Amended): A method of typing using a virtual keyboard having a multitude of virtual keys, comprising the steps:

making typing gestures without any real keyboard;

sensing the typing gestures; and

producing, from the sensed typing gestures, gesture associated textual output

including the step of running processes on a computer to capture gesture images, classify groups of gestures into each gesture image into one of a plurality of classes to classify each gesture image into one of a plurality of, and to associate each of the classes with one of the virtual keys of the virtual keyboard.

Claim 11 (Original): A method according to Claim 10, wherein the typing gestures are made by a person, and further comprising the steps of providing feedback to the person on texture output associated with the gestures.

Claim 12 (Original): A method according to Claim 11, wherein the step of providing feedback includes the step of displaying an image of typing keys associated with the gestures.

Claim 13 (Original): A method according to Claim 10, further comprising the step of generating an image of a keyboard; and wherein the step of making typing gestures includes the step of making typing gestures relative to said image as if said image were a real keyboard.

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Claim 14 (Original): ~~A method according to Claim 10, A method of typing using a virtual keyboard, comprising the steps:~~
making typing gestures without any real keyboard;
sensing the typing gestures; and
producing, from the sensed typing gestures, gesture associated textual output; and
wherein the producing step includes the step of classifying gestures into classes of gesture movement.

✓ Claim 15 (Original): A method according to Claim 14, wherein the producing step further includes the step of associating gesture classes with individual typing keys.

Claim 16 (Currently Amended): A method according to Claim ~~10~~ 14, further comprising providing training data in words or sentences with certain timing data.

Claim 17 (Currently Amended): A typing system using a virtual keyboard, comprising means for sensing typing gestures made without any real keyboard; and
means for producing, from the sensed typing gestures, gesture associated textual output said producing means including a computer and processes running on the computer to capture gesture images, ~~classifying groups of gestures into~~ to classify each gesture image into one of a plurality of classes, and associate each of the classes with one of the keys of the virtual keyboard.

Claim 18 (Original): A system according to Claim 17, wherein the typing gestures are made by a person, and further comprising means for providing feedback to the person on texture output associated with the gestures.

Claim 19 (Original): A system according to Claim 18, wherein the means for providing feedback includes means for displaying an image of typing keys associated with the gestures.

Claim 20 (Original): A system according to Claim 17, further comprising means for generating an image of a keyboard; and wherein the sensing means includes means for sensing typing gestures made relative to said image as if said image were a real keyboard.

Claim 21 (Currently Amended): ~~A system according to Claim 17,~~ A typing system using a virtual keyboard, comprising
means for sensing typing gestures made without any real keyboard; and
means for producing, from the sensed typing gestures, gesture associated textual output; and
wherein the producing means includes means for classifying gestures into classes of gesture movement.

Claim 22 (Original): A system according to Claim 21, wherein the producing means further includes means for associating gesture classes with individual typing keys.